Public Review Comment Matrix

Originating Office:	Document Description: TSO-C151d	Project Lead/Reviewer	Reviewing Office:	Date of Review:
AIR-130		Charisse Green	AIR-6B0	Aug 31, 2017

	Commenter	Section # and Page #	Comment	Suggested Change and Rationale	Disposition
1.	Garmin	Section 1, Page 1	Extraneous single quote mark before "1. Purpose".	Remove the extraneous single quote mark.	Accepted.
2.	Garmin	Section 3, Page 1	The title of the referenced RTCA/DO-367 document is incorrect.	Instead of "*Minimum Operational Performance Standard for Terrain Awareness and Warning Systems*", it should read "*Minimum Operational Performance Standards (MOPS) for Terrain Awareness and Warning Systems (TAWS) Airborne Equipment*".	Accepted.
3.	ACSS	Section 3a, Page 1.	Replace "equipment intended to provide alerts to the flight crew when a terrain threat is detected " with "equipment intended to provide flight crews with aural and visual alert aids aimed at reducing the risk of CFIT accident through increased terrain awareness"	Consistent language with DO-367	Partially Accepted. The statements now reads: "…equipment intended to provide flight crews with aural and visual alerts aimed at reducing the risk of CFIT accident through increased terrain awareness."
4.	Garmin	Section 3.a, Page 1	The following sentence reads awkwardly: *"Class A systems include Terrain Displays intended to provide awareness to the flight crew to the aircraft's proximity to terrain."*	Change the word "*to*" to "*of*" in the phrase "*to the aircraft's proximity to terrain*".	Accepted.

Public Review Comment Matrix

Originating Office:	Document Description: TSO-C151d	Project Lead/Reviewer	Reviewing Office:	Date of Review:
AIR-130		Charisse Green	AIR-6B0	Aug 31, 2017

	Commenter	Section # and Page #	Comment	Suggested Change and Rationale	Disposition
5.	ACSS	Section 3b, page 1.	Restore "due to a TAWS computer malfunction " In the phrasing of "Failure of the function defined in paragraph **3.a** resulting in false terrain warnings, un-annunciated loss of function, or presentation of misleading information is a major failure condition."	False terrain warnings due to external radio altitude or GPS inputs are still fairly common and outside of the TAWS design's control. We believe the TSO-151c and previous properly accounted for this.	Accepted.
6.	Garmin	Section 3.b.(3), Page 2	Paragraph. 3.b.(3) includes the statement: Design the system to at least the above failure condition classifications. Wording needs to change to allow failure condition to be determined at the aircraft level. This statement implies the failure condition classification of an appliance is determined by the TSO regardless of mitigations employed to meet aircraft level safety requirements such as redundant appliances/systems. Unless the DAL cannot be affected by the installation, the aircraft System Safety Assessment should determine the failure classification and by extension, the	Suggest changing to the alternate wording identified in paragraph 3.b. of the TSO Template in Order 8150.1D Appendix G.	Not Accepted. A minimum failure condition classification is appropriate for this TSO. The FAA did modify the section 3.b. language to differentiate Class A/B and Class C systems as follows: **b. <u>Failure Condition Classifications</u>.** **(1)** For Class A and B systems, failure of the function defined in paragraph **3.a** due to a TAWS computer malfunction resulting in

Public Review Comment Matrix

Originating Office:	Document Description: TSO-C151d	Project Lead/Reviewer	Reviewing Office:	Date of Review:
AIR-130		Charisse Green	AIR-6B0	Aug 31, 2017

	Commenter	Section # and Page #	Comment	Suggested Change and Rationale	Disposition
			design assurance level (DAL) requirement. The AFHA/SFHA/PASA/PSSA ultimately determines the DAL requirement for a particular installation. Specifying the DAL at the appliance level without the benefit of the specific AFHA/SFHA/PASA/PSSA means that in some cases the DAL will undoubtedly be higher and more costly than necessary. This will have a chilling effect on the installation of new, safety enhancing technologies since the cost will be greater than necessary. It is possible to build and certify a TSOA appliance that cannot be approved for installation in one or more aircraft types because it does not have the required DAL. Similarly, just because the appliance meets a TSO DAL does not mean it can be approved for installation. We recommend that no failure classification/DAL requirement be included in a TSO when the installation can affect or mitigate the hazard level and therefore consideration should be given to revising paragraph 3.c in this TSO to the general guidance in the Recommendation column.		false terrain warnings, un-annunciated loss of function, or presentation of misleading information is a major failure condition. **(2)** For Class C systems, failure of the function defined in paragraph **3.a** due to a TAWS computer malfunction resulting in false terrain warnings, un-annunciated loss of function, or presentation of misleading information is a minor failure condition. **(3)** Loss of the function defined in paragraph **3.a** is a minor failure condition. **(4)** Design the system to at least these failure condition classifications.

Public Review Comment Matrix

Originating Office:	Document Description: TSO-C151d	Project Lead/Reviewer	Reviewing Office:	Date of Review:
AIR-130		Charisse Green	AIR-6B0	Aug 31, 2017

	Commenter	Section # and Page #	Comment	Suggested Change and Rationale	Disposition
7.	AIRBUS	Section 3.c., Page 2	Tests conditions are specified in the MOPS in § 2.4.8(A), 2.4.9(B) & 2.4.10(C)		Partially Accepted. The paragraph now reads: "Test procedures for Class A, Class B, and Class C equipment are in sections 2.4.10, 2.4.11, and 2.4.12, respectively." For clarity we revised the sentence to say the test "procedures" versus the test "conditions" are in referenced sections.
8.	Garmin	Section 3.e., Page 2	The paragraph references "AC 20-115C, Airborne Software Assurance, dated July 19, 2013". AC 20-115C will soon be replaced by AC 20-115D.	Reference "AC 20-115C or later version", or simply reference AC 20-115D. A draft of A(M)C 20-115D, a follow-on version of AC 20-115C which will be harmonized with EASA's AMC, was recently released by EASA for public comment (ref. EASA NPA 2017-12), and the published AC 20-115D is expected by July 2017.	Accepted. Revised to read "AC 20-115C,…, or latest revision." This change will also be incorporated into the TSO template in appendix G of Order 8150.1D. We did not include AC 20-115D because TSO-C151d is slated to publish before AC 20-115D.

Public Review Comment Matrix

Originating Office:	Document Description: TSO-C151d	Project Lead/Reviewer	Reviewing Office:	Date of Review:
AIR-130		Charisse Green	AIR-6B0	Aug 31, 2017

	Commenter	Section # and Page #	Comment	Suggested Change and Rationale	Disposition
9.	Garmin	Section 3.f., Page 2	Including this specific DO-254 reference is redundant to the rest of the paragraph in this section. For custom electronic hardware determined to be simple, RTCA/DO-254, paragraph 1.6 applies. DO-254 makes it clear how to address "simple" custom airborne electronic hardware.	Remove this reference to DO-254 Paragraph 1.6.	Not Accepted. The intent of referencing DO-254 section 1.6 for simple custom devices in the template is to complement the previous template sentence which only addresses complex custom devices. The inclusion of section 1.6 ensures that the verification and configuration management processes required by DO-254 for simple devices are performed and the resulting data artifacts for these processes created.
10.	Garmin	Section 4.b.(2)., Page 3	Paragraph 4.b.(2) states: Each subassembly of the article that you determined may be interchangeable. This language is confusing.	The language for this requirement is confusing. This could mean that a stuffed printed circuit board needs the TSO number. Suggest removing the statement or updating to wording identified in	Accepted. We aligned the language in section 4 to the TSO template in Order 8150.1D appendix G.

Public Review Comment Matrix

Originating Office:	Document Description: TSO-C151d	Project Lead/Reviewer	Reviewing Office:	Date of Review:
AIR-130		Charisse Green	AIR-6B0	Aug 31, 2017

	Commenter	Section # and Page #	Comment	Suggested Change and Rationale	Disposition
				paragraph 4.b. of the TSO Template in Order 8150.1D Appendix G.	
11.	ACSS	Section 5.a.(1)., Page 3	The following was removed from 151c and should be restored: "The operating instructions must include information on the effects of loss of GPS on the TAWS function if the TAWS relies on GPS. Additionally, the instructions must contain processes by which the terrain database can be updated."	These requirements would appear to be still relevant and these are not found in the new DO-367.	Accepted.
12.	Garmin	Section 5.a.(3). Page 3	The paragraph states to include the following statement: This article meets the minimum performance and quality control standards required by a technical standard order (TSO). Installation of this article requires separate approval This text does not align with the text identified in the TSO Template in Order 8150.1D Appendix G.	Update to align with the text in the TSO Template in Order 8150.1D Appendix G: "This article meets the minimum requirements of {insert the TSO number and revision letter}. Installation of this article requires separate approval."	Accepted.
13.	Garmin	Section 5.f., Page 4	Paragraph. 5.f includes the statement: Identify functionality or	1) Remove "or performance" in accordance with the GAMA non-TSO function	Accepted. Removed "or performance" as suggested.

Public Review Comment Matrix

Originating Office: AIR-130	Document Description: TSO-C151d	Project Lead/Reviewer Charisse Green	Reviewing Office: AIR-6B0	Date of Review: Aug 31, 2017

	Commenter	Section # and Page #	Comment	Suggested Change and Rationale	Disposition
			performance contained in the article not evaluated under paragraph 3 of this TSO (that is, non-TSO functions). Non-TSO functions are accepted in parallel with the TSO authorization. For those non-TSO functions to be accepted, you must declare these functions and include the following information with your TSO application: The GAMA 16-28 "Industry Recommendations on the Management of Non-Technical Standard Order Functions" Recommendation 2 recommended revising the Appendix G TSO template to remove "or performance" from the quoted paragraph 5.f statement to ensure non-TSO function definitions are "fully aligned with the original intended N8150.3 definition". This recommendation was not followed when FAA Order 8150.1D was published.	recommendations. 2) Order 8150.1D Appendix G paragraph 5.f in accordance with the GAMA recommendations. Work with GAMA to address all the non-TSO function recommendations.	The words "or performance" will be removed from the TSO template in appendix G of Order 8150.1D during the next revision.
14.	Garmin	Sections 5.f.(5). and	These sections state the following:	Remove the text "and results" to align with the TSO	Accepted. Will align the language in

Public Review Comment Matrix

Originating Office: AIR-130	Document Description: TSO-C151d	Project Lead/Reviewer Charisse Green	Reviewing Office: AIR-6B0	Date of Review: Aug 31, 2017

	Commenter	Section # and Page #	Comment	Suggested Change and Rationale	Disposition
		5.f.(6)., Page 5	(5) Test plans, analysis **and results**, as appropriate, to verify that performance of the hosting TSO article is not affected by the non-TSO function(s). (6) Test plans, analysis **and results**, as appropriate, to verify the function and performance of the non-TSO function(s) as described in paragraph 5.f.(1). The bolded text "and results" is not included in the TSO Template in Order 8150.1D Appendix G.	Template in Order 8150.1D Appendix G.	this section to align with the TSO template in Order 8150.1D appendix G.
15.	Garmin	Section 5.h., Page 5	This paragraph does not include the following text in Section 5.h in the TSO Template in Order 8150.1D Appendix G: h. A description of your organization as required by 14 CFR 21.605.	Include the reference text to align with the TSO Template in Order 8150.1D Appendix G.	Accepted. Revised to include the 21.605 requirement to match the TSO template in Order 8150.1D, appendix G
16.	Garmin	Section 7., Page 6	This paragraph does not include the following text in Section 7.c. in the TSO Template in Order 8150.1D Appendix G: c. If the article contains software,	Remove paragraph 7.c from Order 8150.1D Appendix G or limit its scope so that the OPR summary only needs to be provided to TC/STC	Partially Accepted. Paragraph 7.c was modified as follows: c. If the article contains software,

Public Review Comment Matrix

Originating Office:	Document Description: TSO-C151d	Project Lead/Reviewer	Reviewing Office:	Date of Review:
AIR-130		Charisse Green	AIR-6B0	Aug 31, 2017

	Commenter	Section # and Page #	Comment	Suggested Change and Rationale	Disposition
			include one copy of the OPR summary. This is good because per Order 8150.1D Appendix G paragraph 7, the OPR summary is considered "furnished data" required to be provided to any "entity (such as an operator or repair station)" that is furnished "articles manufactured under this TSO". Operators and repair stations typically do not have the same capability as a TC/STC design approval holder to make an appropriate assessment of OPR effect. Consequently, it will only serve to cause confusion to require an OPR summary to be provided to operators and repair stations. This same concern has been raised in the context of the FAA/EASA/Industry A(M)C 20-OPR discussions.	design approval holders.	include one copy of the Open Problem Report (OPR) summary to type certification, supplemental type certification, or amended type certification design approval holders.